

REMARKS

The Office Action of February 16, 2010 was received and carefully reviewed. Claims 13-19 were pending prior to this amendment. Claims 1-12 remain canceled without prejudice. By this amendment, claim 15 is amended to recite that each of R¹ and R² of the formula (I) is a hydrogen atom. Support for this amendment may be found, for example, on page 4, lines 11-21 of the originally filed specification. Consequently, claims 13-19 are currently pending. Claims 16 and 17 are withdrawn. No new matter has been introduced through this amendment.

Rejection under 35 U.S.C. § 112, second paragraph

The examiner has rejected claim 15 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. More specifically, the examiner asserts that claim 15 does not further limit claim 13 since claim 13 from which claim 15 depends from already claims vinylene carbonate. Applicants respectfully traverse this rejection at least for the reasons advanced in detail below.

Independent claim 13 recites, *inter alia*, a lithium secondary battery comprising a non-aqueous electrolytic solution containing a vinylene carbonate compound of formula (I),



where each of R¹ and R² independently is a hydrogen atom or an alkyl group having 1 to 4 carbon atoms. Therefore, independent claim 13 contains a genus of compounds sharing the structure of formula (I). Claim 15, on the other hand, further limits the compounds of formula (I) to one specific compound: vinylene carbonate, which corresponds to the compound of formula (I) where each of R¹ and R² is a hydrogen atom.

Nonetheless, in a effort to expedite prosecution and avoid any ambiguity relating to this compound, Applicants have amended claim 15 to clearly indicate that each of R¹ and R² of the formula (I) is a hydrogen atom.

Accordingly, Applicants respectfully request that the examiner withdraw this rejection under 35 U.S.C. § 112, second paragraph.

Rejection under 35 U.S.C. § 103

Claims 13-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0122988 (Now U.S. Patent No. 6,866,966) to Hamamoto et al. ("Hamamoto '988") in view of the abstract of Japanese patent document JP 2003-142075 to Koshina ("Koshina"). Claims 13-15 are further rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,927,001 to Hamamoto et al. ("Hamamoto '001") in view of Koshina. Claims 13-15 are furthermore rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamamoto '988 or Hamamoto '001 in view of Japanese patent document JP 2002-124297 (English translation) to Hamamoto et al. ("Hamamoto '297") and further in view of Koshina. Applicants respectfully traverse these rejections at least for the reasons advanced in detail below.

According to the examiner, Hamamoto '988 teaches a battery comprising an electrolyte solution comprising EC:PC:VC:DEC=25:8:2:65 [volume ratio], where the electrolyte solution further comprises 2 wt% of methyl 2-propynyl carbonate corresponding to the claimed alkyne compound of formula (VI) in which R²⁵-R²⁷ are hydrogen, W is an oxalyl group (C=O) and Y⁶ is an alkyl group, specifically CH₃ (See, paragraph 4 on page 3 of the Office Action). Similarly, the examiner also asserts that Hamamoto '001 teaches a battery comprising an electrolyte solution comprising EC:PC:DEC and additives comprising 1.5 wt% VC and 1.5 wt% methyl propargyl carbonate (MPGC) corresponding to the claimed alkyne compound of formula (VI) in which R²⁵-R²⁷ are hydrogen, W is an oxalyl group (C=O) and Y⁶ is an alkyl group, specifically CH₃ (See, paragraph 5 on pages 4-5 of the Office Action).

However, the examiner's assertions are based on a clearly incorrect understanding of the oxalyl group. W, as defined in the claimed invention, is an oxalyl group, represented by the formula of "O=C-C=O", not by the formula of "C=O". The structural difference between the

carbonyl group (C=O) and the oxalyl group (C=O-C=O) is quite clear. Consequently, contrary to the examiner's assertion, the alkyne compounds in Hamamoto '988 (methyl 2-propynyl carbonate) and Hamamoto '001 (MPGC), contain merely the carbonyl group (C=O). Therefore, neither Hamamoto '988 nor Hamamoto '001 discloses an alkyne compound of formula (VI) in which W is an oxalyl group.

It is further noted that the secondary reference, directed to Koshina, also does not teach or suggest an alkyne compound of formula (VI) in which W is an oxalyl group can be used in a non-aqueous electrolytic solution of a lithium secondary battery. Hence Koshina fails to remedy the deficiencies of Hamamoto '988 and Hamamoto '001.

By citing Hamamoto '297, the examiner contends that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the alkyne compound disclosed in Hamamoto '297 instead of the alkyne compound cited in Hamamoto '988 or Hamamoto '001, "because Hamamoto et al. ('297) teaches that both compounds are known to be used in a battery comprising a solvent comprising PC and DEC and having the same cathode and the same anode therefore one would expect that these compounds would also function in a similar way and give similar results." (See, page 7 of the Office Action)

Applicants respectfully disagree that one skilled in the art would have been motivated to combine the teachings of Hamamoto '988 and Hamamoto '001 with the teachings of Hamamoto '297. Similarly as discussed above, due to the examiner's incorrect understanding of the oxalyl group, the examiner also incorrectly equated the carbonyl group of alkyne compounds of Hamamoto '988 and Hamamoto '001 to the oxalyl group of alkyne compounds of Hamamoto '297, hence incorrectly concluding that Hamamoto '297 contains both alkyne compounds of Hamamoto '988 and Hamamoto '001. On the contrary, Hamamoto '297 is completely silent with regard to the alkyne compounds containing carbonyl group, disclosed in Hamamoto '988 and Hamamoto '001. Therefore, there is no teaching or suggestion in Hamamoto '297 that other alkyne compounds besides those containing oxalyl group would function in a similar way and give similar results in a solvent comprising PC and DEC.

Additionally, Hamamoto '297 does not teach or suggest the use of vinylene carbonate in the electrolytic solution in a lithium secondary battery in an amount of 0.05 to 5 wt%. In fact, Hamamoto '297 is completely silent with regard to vinylene carbonate.

Hence even if Hamamoto '988 or Hamamoto '001 were to be modified by Hamamoto '297, the modification would likely contain both 1) modifying the carbonyl group of alkyne compounds in Hamamoto '988 or Hamamoto '001 to an oxylyl group; and in the same time, 2) remove VC from the electrolytic solution. By such significant modifications, one skilled in the art would have no expectation that the similar functions or similar results would be retained. Under MPEP 2143.01 (V), if the proposed modification would render the prior art unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed amendments. *See, also, In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Accordingly, the obvious rejection is untenable and cannot be maintained. In view of the above remarks, Applicants respectfully request that the examiner withdraw the rejection under 35 U.S.C. § 103(a).

Entry and examination of claims 18-19

Applicants note that claims 18 and 19 added in the Supplemental Preliminary Amendment filed December 1, 2009 have not been entered and examined by the examiner.

The examiner issued an Office Communication on November 20, 2009 giving Applicants one month to complete the Response to the Election Requirement. In response, on December 1, 2009, within the one month period set by the examiner, Applicants filed a Supplemental Response to Election Requirement, as well as a Supplemental Preliminary Amendment to add two new claims, claims 18 and 19. Thus the Supplemental Preliminary Amendment adding claims 18 and 19 is filed timely and does not unduly interfere with the preparation of a first Office Action under § 1.104 in the instant application. Moreover, entry of dependent claims 18 and 19 would not result any change of the nature to the specification or claims.

Therefore, the Supplemental Preliminary Amendment filed on December 1, 2009 is in accordance with 37 C.F.R. § 1.115, and claims 18 and 19 contained therewith should be entered. Accordingly, Applicants respectfully request the examiner enter and examine claims 18-19.

Except for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 19-2380. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,
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